



SEQUENCE LISTING

<110> Barany, Francis
Cao, Weiguo
Tong, Jie

<120> HIGH FIDELITY THERMOSTABLE LIGASE AND USES THEREOF

<130> 19603/2615

<140> 09/830,502

<141> 1999-10-29

<150> 60/106,461

<151> 1998-10-30

<150> PCT/US99/25437

<151> 1999-10-29

<160> 31

<170> PatentIn Ver. 2.1

<210> 1

<211> 674

<212> PRT

<213> Thermus sp.

<400> 1

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Ile Arg Tyr His Asn Tyr Leu Tyr Tyr Val Leu Asp Ala Pro Glu Ile
20 25 30

Ser Asp Ala Glu Tyr Asp Arg Leu Leu Arg Glu Leu Lys Glu Leu Glu
35 40 45

Glu Arg Phe Pro Glu Leu Lys Ser Pro Asp Ser Pro Thr Glu Gln Val
50 55 60

Gly Ala Arg Pro Leu Glu Ala Thr Phe Arg Pro Val Arg His Pro Thr
65 70 75 80

Arg Met Tyr Ser Leu Asp Asn Ala Phe Ser Leu Asp Glu Val Arg Ala
85 90 95

Phe Glu Glu Arg Ile Glu Arg Ala Leu Gly Arg Lys Gly Pro Phe Leu

100	105	110
Tyr Thr Val Glu Arg Lys Val Asp Gly Leu Ser Val Asn Leu Tyr Tyr		
115	120	125
Glu Glu Gly Ile Leu Val Phe Gly Ala Thr Arg Gly Asp Gly Glu Thr		
130	135	140
Gly Glu Glu Val Thr Gln Asn Leu Leu Thr Ile Pro Thr Ile Pro Arg		
145	150	155
Arg Leu Thr Gly Val Pro Asp Arg Leu Glu Val Arg Gly Glu Val Tyr		
165	170	175
Met Pro Ile Glu Ala Phe Leu Arg Leu Asn Gln Glu Leu Glu Glu Ala		
180	185	190
Gly Glu Arg Ile Phe Lys Asn Pro Arg Asn Ala Ala Ala Gly Ser Leu		
195	200	205
Arg Gln Lys Asp Pro Arg Val Thr Ala Arg Arg Gly Leu Arg Ala Thr		
210	215	220
Phe Tyr Ala Leu Gly Leu Gly Leu Glu Glu Thr Gly Leu Lys Ser Gln		
225	230	235
His Asp Leu Leu Leu Trp Leu Arg Glu Arg Gly Phe Pro Val Glu His		
245	250	255
Gly Phe Thr Arg Ala Leu Gly Ala Glu Gly Val Glu Glu Val Tyr Gln		
260	265	270
Ala Trp Leu Lys Glu Arg Arg Lys Leu Pro Phe Glu Ala Asp Gly Val		
275	280	285
Val Val Lys Leu Asp Asp Leu Ala Leu Trp Arg Glu Leu Gly Tyr Thr		
290	295	300
Ala Arg Thr Pro Arg Phe Ala Leu Ala Tyr Lys Phe Pro Ala Glu Glu		
305	310	315
Lys Glu Thr Arg Leu Leu Ser Val Ala Phe Gln Val Gly Arg Thr Gly		
325	330	335
Arg Ile Thr Pro Val Gly Val Leu Glu Pro Val Phe Ile Glu Gly Ser		
340	345	350
Glu Val Ser Arg Val Thr Leu His Asn Glu Ser Phe Ile Glu Glu Leu		

355		360		365
Asp Val Arg Ile Gly Asp Trp Val Leu Val His Lys Ala Gly Gly Val				
370		375		380
Ile Pro Glu Val Leu Arg Val Leu Lys Glu Arg Arg Thr Gly Glu Glu				
385		390		395
				400
Lys Pro Ile Ile Trp Pro Glu Asn Cys Pro Glu Cys Gly His Ala Leu				
		405		410
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Ile Lys Glu Gly Lys Val His Arg Cys Pro Asn Pro Leu Cys Pro Ala				
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				430
Lys Arg Phe Glu Ala Ile Arg His Tyr Ala Ser Arg Lys Ala Met Asp				
		435		440
				445
Ile Gln Gly Leu Gly Glu Lys Leu Ile Glu Lys Leu Leu Glu Lys Gly				
		450		455
				460
Leu Val Arg Asp Val Ala Asp Leu Tyr Arg Leu Lys Lys Glu Asp Leu				
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				480
Val Asn Leu Glu Arg Met Gly Glu Lys Ser Ala Glu Asn Leu Leu Arg				
		485		490
				495
Gln Ile Glu Glu Ser Lys Gly Arg Gly Leu Glu Arg Leu Leu Tyr Ala				
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				510
Leu Gly Leu Pro Gly Val Gly Glu Val Leu Ala Arg Asn Leu Ala Leu				
		515		520
				525
Arg Phe Gly His Met Asp Arg Leu Leu Glu Ala Gly Leu Glu Asp Leu				
		530		535
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Leu Glu Val Glu Gly Val Gly Glu Leu Thr Ala Arg Ala Ile Leu Asn				
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				560
Thr Leu Lys Asp Pro Glu Phe Arg Asp Leu Val Arg Arg Leu Lys Glu				
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Ala Gly Val Glu Met Glu Ala Lys Glu Arg Glu Gly Glu Ala Leu Lys				
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Gly Leu Thr Phe Val Ile Thr Gly Glu Leu Ser Arg Pro Arg Glu Glu				
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				605
Val Lys Ala Leu Leu Arg Arg Leu Gly Ala Lys Val Thr Asp Ser Val				

610 615 620
 Ser Arg Lys Thr Ser Phe Leu Val Val Gly Glu Asn Pro Gly Ser Lys
 625 630 635 640
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 acggaacagg tgggggagcgc gcctctggag gccaccttc gcccggtgcg ccacccacc 240
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 gccttctca ggctcaacca ggagctggag gaggcggggg agcgcatctt caaaaacccc 600
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<210> 3
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<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: probe or
primer

<220>
<221> tRNA
<222> (4)
<223> w at position 4 can be T or A

<220>
<221> unsure
<222> (5)
<223> s at position 5 can be C or G

<220>
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<222> (12)
<223> s at position 12 can be C or G

<220>
<221> unsure
<222> (15)
<223> r at position 15 can be G or A

<220>
<221> unsure
<222> (18)
<223> y at position 18 can be T or C

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<210> 4

<211> 7
<212> PRT
<213> Artificial Sequence

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<210> 5
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<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: probe or
primer

<220>
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<222> (3)
<223> s at position 3 can be C or G

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<222> (6)
<223> s at position 6 can be C or G

<220>
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<222> (8)
<223> k at position 8 can be G or T

<220>
<221> unsure
<222> (9)
<223> s at position 9 can be G or C

<220>
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<222> (12)
<223> s at position 12 can be G or C

<220>
<221> unsure

<222> (15)
<223> y at position 15 can be C or T

<220>
<221> unsure
<222> (18)
<223> r at position 18 can be A or G

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ccsgtscksc csacytgraa

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<210> 6
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<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: probe or
primer

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<222> (9)
<223> v at position 9 can be C, G, or A

<220>
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<222> (11)
<223> r at position 11 can be A or G

<220>
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<222> (12)
<223> y at position 12 can be T or C

<220>
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<222> (16)
<223> s at position 16 is C or G

<220>
<221> unsure
<222> (17)
<223> w at position 17 can be A or T

<220>
<221> unsure

<222> (18)

<223> s at position 18 can be G or C

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20

<210> 7

<211> 7

<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: probe or
primer

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5

<210> 8

<211> 7

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<220>

<223> Description of Artificial Sequence: probe or
primer

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Gly Ser Lys Leu Glu Lys Ala

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5

<210> 9

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: probe or
primer

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gcgatttcat atgaccctag aggaggcccg

30

<210> 10
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 <213> Artificial Sequence

<220>
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<210> 11
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<400> 11
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 <223> Description of Artificial Sequence: probe or primer

<400> 12
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 <213> Artificial Sequence

<220>
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<400> 13
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29

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<213> Artificial Sequence

<220>
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primer

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<210> 15
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<213> Thermus aquaticus

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<223> Xaa at positions 18-120 is any amino acid

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<222> (126)..(172)
<223> Xaa at positions 126-172 is any amino acid

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Tyr Thr Val Glu His Lys Val Asp Gly Leu Ser Val Asn Leu Tyr Tyr
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20 25 30
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
50 55 60
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Glu Glu Thr Gly Xaa Xaa Xaa
115 120 125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
130 135 140

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
145 150 155 160

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Phe Glu Ala
165 170 175

Asp Gly Val Val Val Lys Leu Asp
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<210> 16
<211> 187
<212> PRT
<213> Thermus flavus

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<222> (129)..(175)
<223> Xaa at positions 129-175 is any amino acid

<400> 16
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1 5 10 15

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20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa

50	55	60
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa		
65	70	75 80
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa		
	85	90 95
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa		
	100	105 110
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa		
	115	120 125
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa		
	130	135 140
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa		
	145	150 155 160
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa		
	165	170 175
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa		
	180	185

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 <213> Thermus filiformis

<220>
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 <223> Xaa at positions 18-120 is any amino acid

<220>
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 <222> (126)..(172)
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<400> 17
 Tyr Thr Val Glu His Lys Val Asp Gly Leu Ser Val Asn Leu Tyr Tyr
 1 5 10 15

Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
50 55 60

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
115 120 125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
130 135 140

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
145 150 155 160

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
165 170 175

Asp Gly Val Val Val Lys Met Asp
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<210> 18
<211> 184
<212> PRT
<213> *Thermus filiformis*

<220>
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<222> (18)..(120)
<223> Xaa at positions 18-120 is any amino acid

<220>
<221> UNSURE
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<223> Xaa at positions 126-172 is any amino acid

<400> 18

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Glu	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			20					25					30		
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			35				40					45			
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			50				55					60			
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			65				70				75				80
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
					85				90					95	
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
					100				105					110	
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Leu	Glu	Glu	Ser	Gly	Xaa	Xaa	Xaa
					115				120				125		
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
					130				135				140		
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
					145				150			155			160
Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Pro	Phe	Glu	Ala
					165				170					175	
Asp	Gly	Val	Val	Val	Lys	Leu	Asp								
					180										

<210> 19

<211> 184

<212> PRT

<213> Thermus sp.

<220>

<221> UNSURE

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<223> Xaa at positions 18-120 is any amino acid

<220>

<221> UNSURE

<222> (126)..(172)

<223> Xaa at positions 126-172 is any amino acid

<400> 19

Tyr Thr Val Glu His Lys Val Asp Gly Leu Ser Val Asn Leu Tyr Tyr
1 5 10 15

Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
50 55 60

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
115 120 125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
130 135 140

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
145 150 155 160

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Phe Glu Ala
165 170 175

Asp Gly Val Val Val Lys Leu Asp
180

<210> 20

<211> 184

<212> PRT

<213> Thermus sp.

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<221> UNSURE

<222> (18)..(120)

<223> Xaa at positions 18-120 is any amino acid

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<221> UNSURE

<222> (126)..(172)

<223> Xaa at positions 126-172 is any amino acid

<400> 20

Tyr Thr Val Glu His Lys Val Asp Gly Leu Ser Val Asn Leu Tyr Tyr
1 5 10 15

Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
50 55 60

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
115 120 125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
130 135 140

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
145 150 155 160

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
165 170 175

Asp Gly Val Val Val Lys Leu Asp
180

<210> 21

<211> 184

<212> PRT

<213> *Thermus* sp.

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<222> (18)..(120)

<223> Xaa at positions 18-120 is any amino acid

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<223> Xaa at positions 126-172 is any amino acid

<400> 21

Tyr	Thr	Val	Glu	His	Lys	Val	Asp	Gly	Leu	Ser	Val	Asn	Leu	Tyr	Tyr
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Glu	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			20					25						30	

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			35					40						45	

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			50					55						60	

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			65					70						75	80

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
								85						90	95

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
								100						105	110

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Leu	Glu	Glu	Ser	Gly	Xaa	Xaa	Xaa
								115						120	125

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
								130						135	140

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
								145						150	155

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Pro	Phe	Glu	Ala
								165						170	175

Asp Gly Val Val Val Lys Leu Asp
180

<210> 22
<211> 184
<212> PRT
<213> Thermus aquaticus

<220>
<221> UNSURE
<222> (18)..(120)
<223> Xaa at positions 18-120 is any amino acid

<220>
<221> UNSURE
<222> (126)..(172)
<223> Xaa at positions 126-172 is any amino acid

<400> 22
Tyr Thr Val Glu Arg Lys Val Asp Gly Leu Ser Val Asn Leu Tyr Tyr
1 5 10 15
Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
20 25 30
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
50 55 60
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65 70 75 80
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
100 105 110
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Glu Glu Thr Gly Xaa Xaa Xaa
115 120 125
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
130 135 140
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa

145	150	155	160
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Phe Glu Ala			
	165	170	175

Asp Gly Val Val Val Lys Leu Asp
180

<210> 23
<211> 187
<212> PRT
<213> *Thermus flavus*

<220>
<221> UNSURE
<222> (18)..(120)
<223> Xaa at positions 18-20 is any amino acid

<220>
<221> UNSURE
<222> (129)..(175)
<223> Xaa at positions 129-175 is any amino acid

<400> 23
Tyr Thr Val Glu His Lys Val Asp Gly Leu Ser Val Asn Leu Tyr Tyr
1 5 10 15

Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
50 55 60

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
115 120 125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
130 135 140

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
145 150 155 160

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro
165 170 175

Phe Glu Ala Asp Gly Val Val Val Lys Leu Asp
180 185

<210> 24

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide

<220>

<221> VARIANT

<222> (2)

<223> X at position 2 is any amino acid

<400> 24

Lys Xaa Asp Gly
1

<210> 25

<211> 527

<212> PRT

<213> Thermus aquaticus YT-1

<400> 25

Pro Glu Leu Lys Ser Pro Asp Ser Pro Thr Glu Gln Val Gly Ala Arg
1 5 10 15

Pro Leu Glu Ser Thr Phe Arg Pro Val Arg His Pro Thr Arg Met Tyr
20 25 30

Ser Leu Asp Asn Ala Phe Ser Leu Asp Glu Val Arg Ala Phe Glu Glu
35 40 45

Arg Ile Glu Arg Ala Leu Gly Arg Lys Gly Pro Phe Leu Tyr Thr Val

50	55	60
Glu His Lys Val Asp Gly Leu Ser Val Asn Leu Tyr Tyr Glu Glu Gly		
65	70	75 80
Ile Leu Val Phe Gly Ala Thr Arg Gly Asp Gly Glu Thr Gly Glu Glu		
	85	90 95
Val Thr Gln Asn Leu Leu Thr Ile Arg Thr Ile Pro Arg Arg Leu Thr		
	100	105 110
Gly Val Pro Asp Arg Leu Glu Val Arg Gly Glu Val Tyr Met Pro Ile		
	115	120 125
Glu Ala Phe Leu Arg Leu Asn Gln Glu Leu Glu Glu Ala Gly Glu Arg		
	130	135 140
Ile Phe Lys Asn Pro Arg Asn Ala Ala Ala Gly Ser Leu Arg Gln Lys		
145	150	155 160
Asp Pro Arg Val Thr Ala Arg Arg Gly Leu Arg Ala Thr Phe Tyr Ala		
	165	170 175
Leu Gly Leu Gly Leu Glu Glu Thr Gly Leu Lys Ser Gln His Asp Leu		
	180	185 190
Leu Leu Trp Leu Lys Glu Arg Gly Phe Pro Val Glu His Gly Phe Thr		
	195	200 205
Arg Ala Leu Gly Ala Glu Gly Val Glu Glu Val Tyr Gln Ala Trp Leu		
	210	215 220
Lys Glu Arg Arg Lys Leu Pro Phe Glu Ala Asp Gly Val Val Val Lys		
225	230	235 240
Leu Asp Asp Leu Ala Leu Trp Arg Glu Leu Gly Tyr Thr Ala Arg Ala		
	245	250 255
Pro Arg Phe Ala Leu Ala Tyr Lys Phe Pro Ala Glu Glu Lys Glu Thr		
	260	265 270
Arg Leu Leu Ser Val Ala Phe Gln Val Gly Arg Thr Gly Arg Ile Thr		
	275	280 285
Pro Val Gly Val Leu Glu Pro Val Phe Ile Glu Gly Ser Glu Val Ser		
	290	295 300
Arg Val Thr Leu His Asn Glu Ser Phe Ile Glu Glu Leu Asp Val Arg		

305		310		315		320
Ile Gly Asp Trp Val Leu Val His Lys Ala Gly Gly Val Ile Pro Glu						
	325		330		335	
Val Leu Arg Val Leu Lys Glu Arg Arg Thr Gly Glu Glu Lys Pro Ile						
	340		345		350	
Leu Trp Pro Glu Asn Cys Pro Glu Cys Gly His Ala Leu Leu Lys Glu						
	355		360		365	
Gly Lys Val His Arg Cys Pro Asn Pro Leu Cys Pro Ala Lys Arg Phe						
	370		375		380	
Glu Ala Ile Arg His Tyr Ala Ser Arg Lys Ala Met Asp Ile Gln Gly						
385		390		395		400
Leu Gly Glu Lys Leu Ile Glu Lys Leu Leu Glu Lys Gly Leu Val Arg						
	405		410		415	
Asp Val Ala Asp Leu Tyr Arg Leu Arg Lys Glu Asp Leu Leu Asp Leu						
	420		425		430	
Glu Arg Met Gly Glu Lys Ser Ala Glu Asn Leu Leu Arg Gln Ile Glu						
	435		440		445	
Glu Ser Lys Gly Arg Gly Leu Glu Arg Leu Leu Tyr Ala Leu Gly Leu						
	450		455		460	
Pro Gly Val Gly Glu Val Leu Ala Arg Asn Leu Ala Leu Arg Phe Gly						
465		470		475		480
His Met Asp Arg Leu Leu Glu Ala Gly Leu Gly Asp Leu Leu Glu Val						
	485		490		495	
Glu Gly Val Gly Glu Leu Thr Ala Arg Ala Ile Leu Asn Thr Leu Lys						
	500		505		510	
Asp Pro Glu Phe Arg Asp Leu Val Arg Arg Leu Lys Glu Ala Gly						
	515		520		525	

<210> 26

<211> 557

<212> PRT

<213> *Thermus aquaticus flavus*

<400> 26

Arg	Phe	Pro	Glu	Leu	Lys	Ser	Pro	Asp	Ser	Pro	Thr	Glu	Gln	Val	Gly	1	5	10	15
Ala	Arg	Pro	Leu	Glu	Ala	Thr	Phe	Arg	Pro	Val	Arg	His	Pro	Thr	Arg	20	25	30	
Met	Tyr	Ser	Leu	Asp	Asn	Ala	Phe	Asn	Phe	Asp	Glu	Leu	Lys	Ala	Phe	35	40	45	
Glu	Glu	Arg	Ile	Glu	Arg	Ala	Leu	Gly	Arg	Glu	Gly	Pro	Phe	Ala	Tyr	50	55	60	
Thr	Val	Glu	His	Lys	Val	Asp	Gly	Leu	Ser	Val	Asn	Leu	Tyr	Tyr	Glu	65	70	75	80
Asp	Gly	Val	Leu	Val	Tyr	Gly	Ala	Thr	Arg	Gly	Asp	Gly	Glu	Val	Gly	85	90	95	
Glu	Glu	Val	Thr	Gln	Asn	Leu	Leu	Thr	Ile	Pro	Thr	Ile	Pro	Arg	Arg	100	105	110	
Leu	Lys	Gly	Val	Pro	Glu	Arg	Leu	Glu	Val	Arg	Gly	Glu	Val	Tyr	Met	115	120	125	
Pro	Val	Glu	Ala	Phe	Leu	Arg	Leu	Asn	Glu	Glu	Leu	Glu	Glu	Arg	Gly	130	135	140	
Ala	Arg	Ile	Phe	Lys	Asn	Pro	Arg	Asn	Ala	Ala	Ala	Gly	Ser	Leu	Arg	145	150	155	160
Gln	Lys	Asp	Pro	Arg	Ile	Thr	Ala	Lys	Arg	Gly	Leu	Arg	Ala	Thr	Phe	165	170	175	
Tyr	Ala	Leu	Gly	Leu	Gly	Leu	Glu	Glu	Val	Glu	Arg	Glu	Gly	Val	Ala	180	185	190	
Thr	Gln	Phe	Ala	Leu	Leu	His	Trp	Leu	Lys	Glu	Lys	Ser	Phe	Pro	Val	195	200	205	
Glu	His	Gly	Tyr	Ala	Arg	Ala	Val	Gly	Ala	Glu	Gly	Val	Glu	Ala	Val	210	215	220	
Tyr	Gln	Asp	Trp	Leu	Lys	Lys	Arg	Arg	Ala	Leu	Pro	Phe	Glu	Ala	Asp	225	230	235	240
Gly	Val	Val	Val	Lys	Leu	Asp	Glu	Leu	Ala	Leu	Trp	Arg	Glu	Leu	Gly	245	250	255	

Tyr Thr Ala Arg Ala Pro Arg Phe Ala Ile Ala Tyr Lys Phe Pro Ala		
260	265	270
Glu Glu Lys Glu Thr Arg Leu Leu Asp Val Ala Phe Gln Val Gly Arg		
275	280	285
Thr Gly Arg Val Thr Pro Val Gly Ile Leu Glu Pro Val Phe Leu Glu		
290	295	300
Gly Ser Glu Val Ser Arg Val Thr Leu His Asn Glu Ser Tyr Ile Glu		
305	310	315 320
Glu Leu Asp Ile Arg Ile Gly Asp Trp Val Leu Val His Lys Ala Gly		
325	330	335
Gly Val Ile Pro Glu Val Leu Arg Val Leu Lys Glu Arg Arg Thr Gly		
340	345	350
Glu Glu Arg Pro Ile Arg Trp Pro Glu Thr Cys Pro Glu Cys Gly His		
355	360	365
Arg Leu Leu Lys Glu Gly Lys Val His Arg Cys Pro Asn Pro Leu Cys		
370	375	380
Pro Ala Lys Arg Phe Glu Ala Ile Arg His Phe Pro Ser Arg Lys Ala		
385	390	395 400
Met Asp Ile Gln Gly Leu Gly Glu Lys Leu Ile Glu Arg Leu Leu Glu		
405	410	415
Lys Gly Leu Val Lys Asp Val Ala Asp Leu Tyr Arg Leu Arg Lys Glu		
420	425	430
Asp Leu Val Gly Leu Glu Arg Met Gly Glu Lys Ser Ala Gln Asn Leu		
435	440	445
Leu Arg Gln Ile Glu Glu Ser Lys Arg Arg Gly Leu Glu Arg Leu Leu		
450	455	460
Tyr Ala Leu Gly Leu Pro Gly Val Gly Glu Val Leu Ala Arg Asn Leu		
465	470	475 480
Ala Ala Arg Phe Gly Asn Met Asp Arg Leu Leu Glu Ala Ser Leu Glu		
485	490	495
Glu Leu Leu Glu Val Glu Glu Val Gly Glu Leu Thr Ala Arg Ala Ile		
500	505	510

Leu Glu Thr Leu Lys Asp Pro Ala Phe Arg Asp Leu Val Arg Arg Leu
515 520 525

Lys Glu Ala Gly Val Glu Met Glu Ala Lys Glu Lys Gly Gly Glu Ala
530 535 540

Leu Lys Gly Leu Thr Phe Val Ile Thr Gly Glu Leu Ser
545 550 555

<210> 27

<211> 546

<212> PRT

<213> Thermus filiformis Tok4A2

<400> 27

Asp Ser Pro Thr Glu Gln Val Gly Ala Arg Pro Leu Glu Pro Thr Phe
1 5 10 15

Arg Pro Val Arg His Pro Thr Arg Met Tyr Ser Leu Asp Asn Ala Phe
20 25 30

Thr Tyr Glu Glu Val Leu Ala Phe Glu Glu Arg Leu Asp Arg Ala Leu
35 40 45

Gly Arg Lys Arg Pro Phe Leu Tyr Thr Val Glu His Lys Val Asp Gly
50 55 60

Leu Ser Val Asn Leu Tyr Tyr Glu Glu Gly Val Leu Val Phe Gly Ala
65 70 75 80

Thr Arg Gly Asp Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95

Thr Ile Pro Thr Ile Pro Arg Arg Leu Lys Gly Val Pro Asp Arg Leu
100 105 110

Glu Val Arg Gly Glu Val Tyr Met Pro Ile Glu Ala Phe Leu Arg Leu
115 120 125

Asn Glu Glu Leu Glu Glu Arg Gly Glu Lys Val Phe Lys Asn Pro Arg
130 135 140

Asn Ala Ala Ala Gly Ser Leu Arg Gln Lys Asp Pro Arg Val Thr Ala
145 150 155 160

Lys Arg Gly Leu Arg Ala Thr Phe Tyr Ala Leu Gly Leu Gly Leu Glu
165 170 175

Glu Ser Gly Leu Lys Ser Gln Tyr Glu Leu Leu Leu Trp Leu Lys Glu		
180	185	190
Lys Gly Phe Pro Val Glu His Gly Tyr Glu Lys Ala Leu Gly Ala Glu		
195	200	205
Gly Val Glu Glu Val Tyr Gln Ala Xaa Xaa Xaa Lys Arg His Ala Leu		
210	215	220
Pro Phe Glu Ala Asp Gly Val Val Val Lys Met Asp Asp Leu Thr Leu		
225	230	235 240
Trp Gly Glu Leu Gly Tyr Thr Ala Arg Ala Pro Arg Phe Ala Ile Ala		
245	250	255
Tyr Lys Phe Pro Ala Glu Glu Asn Glu Thr Arg Leu Leu Asp Val Asp		
260	265	270
Phe Gln Val Gly Arg Thr Gly Arg Val Thr Pro Val Gly Ile Leu Glu		
275	280	285
Pro Val Phe Leu Glu Gly Ser Glu Val Ser Arg Val Thr Leu His Asn		
290	295	300
Glu Ser Tyr Ile Glu Glu Leu Asp Ile Arg Ile Gly Asp Trp Val Leu		
305	310	315 320
Val His Lys Ala Gly Gly Val Ile Pro Glu Val Leu Arg Val Leu Lys		
325	330	335
Glu Arg Arg Thr Gly Glu Glu Arg Pro Ile Arg Trp Pro Glu Thr Cys		
340	345	350
Pro Glu Cys Gly His Arg Leu Leu Lys Glu Gly Lys Val His Arg Cys		
355	360	365
Pro Asn Pro Leu Cys Pro Ala Lys Arg Phe Glu Ala Ile Arg His Phe		
370	375	380
Pro Ser Arg Lys Ala Met Asp Ile Gln Gly Leu Gly Glu Lys Leu Ile		
385	390	395 400
Glu Arg Leu Leu Glu Lys Gly Leu Val Lys Asp Val Ala Asp Leu Tyr		
405	410	415
Arg Leu Arg Lys Glu Asp Leu Val Gly Leu Glu Arg Met Gly Glu Lys		
420	425	430

Ser Ala Gln Asn Leu Leu Arg Gln Ile Glu Glu Ser Lys Arg Arg Gly
 435 440 445

Leu Glu Arg Leu Leu Tyr Ala Leu Gly Leu Pro Gly Val Gly Glu Val
 450 455 460

Leu Ala Arg Asn Leu Ala Ala Arg Phe Gly Asn Met Asp Arg Leu Leu
 465 470 475 480

Glu Ala Ser Leu Glu Glu Leu Leu Glu Val Glu Glu Val Gly Glu Leu
 485 490 495

Thr Ala Arg Ala Ile Leu Glu Thr Leu Lys Asp Pro Ala Phe Arg Asp
 500 505 510

Leu Val Arg Arg Leu Lys Glu Ala Gly Val Glu Met Glu Ala Lys Glu
 515 520 525

Lys Gly Gly Glu Ala Leu Lys Gly Leu Thr Phe Val Ile Thr Gly Glu
 530 535 540

Leu Ser
 545

<210> 28

<211> 537

<212> PRT

<213> Thermus filiformis Tok6A1

<400> 28

Arg Phe Pro Glu Phe Lys Ser Pro Asp Ser Pro Thr Glu Gln Val Gly
 1 5 10 15

Ala Arg Pro Leu Glu Pro Thr Phe Arg Pro Val Arg His Pro Thr Arg
 20 25 30

Met Tyr Ser Leu Asp Asn Ala Phe Thr Tyr Glu Glu Val Leu Ala Phe
 35 40 45

Glu Glu Arg Leu Glu Arg Ala Leu Gly Arg Lys Arg Pro Phe Leu Tyr
 50 55 60

Thr Val Glu His Lys Val Asp Gly Leu Ser Val Asn Leu Tyr Tyr Glu
 65 70 75 80

Glu Gly Val Leu Val Phe Gly Ala Thr Arg Gly Asp Gly Glu Val Gly

340	345	350
Pro Ile Arg Trp Pro Glu Thr Cys Pro Glu Cys Gly His Arg Leu Val		
355	360	365
Lys Glu Gly Lys Val His Arg Cys Pro Asn Pro Leu Cys Pro Ala Lys		
370	375	380
Arg Phe Glu Ala Ile Arg His Tyr Ala Ser Arg Lys Ala Met Asp Ile		
385	390	395 400
Glu Gly Leu Gly Glu Lys Leu Ile Glu Arg Leu Leu Glu Lys Gly Leu		
405	410	415
Val Arg Asp Val Ala Asp Leu Tyr His Leu Arg Lys Glu Asp Leu Leu		
420	425	430
Gly Leu Glu Arg Met Gly Glu Lys Ser Ala Gln Asn Leu Leu Arg Gln		
435	440	445
Ile Glu Glu Ser Lys His Arg Gly Leu Glu Arg Leu Leu Tyr Ala Leu		
450	455	460
Gly Leu Pro Gly Val Gly Glu Val Leu Ala Arg Asn Leu Ala Arg Arg		
465	470	475 480
Phe Gly Thr Met Asp Arg Leu Leu Glu Ala Ser Leu Glu Glu Leu Leu		
485	490	495
Glu Val Glu Glu Val Gly Glu Leu Thr Ala Arg Ala Ile Leu Glu Thr		
500	505	510
Leu Lys Asp Pro Ala Phe Arg Asp Leu Val Arg Arg Leu Lys Glu Ala		
515	520	525
Gly Val Ser Met Glu Ser Lys Glu Glu		
530	535	

<210> 29

<211> 505

<212> PRT

<213> Thermus sp. Vil3

<400> 29

Pro Ser Pro Asp Ser Pro Thr Glu Gln Val Gly Ala Lys Pro Leu Glu
1 5 10 15

Ala Thr Phe Arg Pro Ile Arg His Pro Thr Arg Met Tyr Ser Leu Asp		
20	25	30
Asn Ala Phe Thr Leu Glu Glu Val Arg Thr Phe Glu Glu Arg Ile Glu		
35	40	45
Arg Ala Leu Gly Arg Lys Gly Pro Phe Val Tyr Thr Val Glu His Lys		
50	55	60
Val Asp Gly Leu Ser Val Asn Leu Tyr Tyr Glu Glu Gly Ile Leu Val		
65	70	75 80
Trp Gly Ala Thr Arg Gly Asp Gly Glu Thr Gly Glu Glu Val Thr Gln		
85	90	95
Asn Leu Leu Thr Ile Pro Thr Ile Pro Arg Arg Leu Lys Gly Val Pro		
100	105	110
Glu Arg Leu Glu Val Arg Gly Glu Val Tyr Met Pro Ile Glu Ala Phe		
115	120	125
Leu Arg Leu Asn Glu Glu Leu Glu Glu Lys Gly Glu Lys Ile Phe Lys		
130	135	140
Asn Pro Arg Asn Ala Ala Ala Gly Ser Phe Arg Gln Lys Asp Pro Arg		
145	150	155 160
Ile Thr Ala Arg Arg Gly Leu Arg Ala Thr Phe Tyr Ala Leu Gly Leu		
165	170	175
Gly Leu Glu Glu Ser Gly Leu Lys Thr Gln Leu Asp Leu Leu His Trp		
180	185	190
Leu Arg Glu Lys Gly Phe Pro Val Glu His Gly Phe Ala Arg Ala Glu		
195	200	205
Gly Ala Glu Gly Val Glu Arg Ile Tyr Gln Gly Trp Leu Lys Glu Arg		
210	215	220
Arg Ser Leu Pro Phe Glu Ala Asp Gly Val Val Val Lys Leu Asp Glu		
225	230	235 240
Leu Ser Leu Trp Arg Glu Leu Gly Tyr Thr Ala Arg Ala Pro Arg Phe		
245	250	255
Ala Ile Ala Tyr Lys Phe Pro Ala Glu Glu Lys Glu Thr Ala Leu Phe		
260	265	270

Gln Val Val Leu Gln Val Gly Arg Thr Gly Gln Val Thr Pro Val Gly
 275 280 285

Ile Leu Glu Pro Val Phe Ile Glu Gly Ser Glu Val Ser Arg Val Thr
 290 295 300

Leu His Asn Glu Ser Tyr Ile Glu Asp Leu Asp Val Arg Ile Gly Glu
 305 310 315 320

Trp Val Leu Val His Asn Ala Gly Gly Val Ile Pro Glu Val Leu Arg
 325 330 335

Val Leu Lys Glu Lys Arg Thr Gly Glu Glu Arg Pro Ile Arg Trp Pro
 340 345 350

Glu Thr Cys Pro Glu Cys Gly His Arg Leu Val Lys Glu Gly Lys Val
 355 360 365

His Arg Cys Pro Asn Pro Leu Cys Pro Ala Lys Arg Phe Glu Ala Ile
 370 375 380

Arg His Tyr Ala Ser Arg Lys Ala Met Asp Ile Gly Gly Leu Gly Glu
 385 390 395 400

Lys Leu Ile Glu Lys Leu Leu Glu Lys Gly Leu Val Lys Asp Val Ala
 405 410 415

Asp Leu Tyr Arg Leu Lys Glu Glu Asp Leu Val Gly Leu Glu Arg Met
 420 425 430

Gly Lys Lys Ser Ala Gln Asn Leu Leu Arg Gln Ile Glu Lys Ser Lys
 435 440 445

Ala Arg Gly Leu Glu Arg Leu Leu Tyr Ala Leu Gly Leu Pro Gly Val
 450 455 460

Gly Glu Val Leu Ala Arg Asn Leu Ala Ala His Phe Gly Thr Met Asp
 465 470 475 480

Arg Leu Leu Glu Ala Ser Leu Glu Glu Leu Leu Gln Val Glu Glu Val
 485 490 495

Gly Glu Leu Thr Ala Arg Gly Ile Tyr
 500 505

<210> 30
 <211> 481

<212> PRT

<213> Thermus sp. SM32

<400> 30

Asp Asn Ala Phe Thr His His Asp Leu Lys Ala Phe Glu Asp Arg Val
1 5 10 15

Asp Arg Ala Leu Gly Arg Glu Gly Pro Phe Val Tyr Thr Val Glu His
20 25 30

Lys Val Asp Gly Leu Ser Val Asn Leu Tyr Tyr Glu Glu Gly Ile Leu
35 40 45

Val Phe Gly Ala Pro Arg Gly Asp Gly Glu Val Gly Glu Glu Val Thr
50 55 60

Gln Asn Leu Leu Thr Ile Pro Thr Ile Pro Arg Arg Leu Lys Gly Val
65 70 75 80

Pro Glu Arg Leu Glu Val Arg Gly Glu Val Tyr Met Pro Ile Glu Ala
85 90 95

Phe Leu Arg Leu Asn Glu Glu Leu Glu Glu Ala Gly Glu Lys Val Phe
100 105 110

Lys Asn Pro Arg Asn Ala Ala Ala Gly Ser Leu Arg Gln Lys Asp Pro
115 120 125

Arg Ile Thr Ala Lys Arg Gly Leu Arg Ala Thr Phe Tyr Ala Leu Gly
130 135 140

Leu Gly Leu Glu Glu Ser Gly Leu Lys Thr Gln Tyr Glu Phe Leu Leu
145 150 155 160

Trp Phe Lys Glu Lys Gly Phe Pro Val Glu His Gly Phe Ala Arg Ala
165 170 175

Thr Gly Ala Glu Gly Val Glu Arg Val Tyr Gln Gly Trp Leu Gln Lys
180 185 190

Arg Arg Lys Leu Pro Phe Glu Ala Asp Gly Val Val Val Lys Leu Asp
195 200 205

Glu Leu Ala Leu Trp Arg Glu Leu Gly Tyr Thr Ala Arg Ala Pro Arg
210 215 220

Phe Ala Ile Ala Tyr Lys Phe Pro Ala Glu Glu Lys Glu Thr Arg Leu
225 230 235 240

Leu Asp Val Val Phe Gln Val Gly Arg Thr Gly Arg Val Thr Pro Val
 245 250 255
 Gly Ile Leu Glu Pro Val Leu Ile Glu Gly Ser Glu Val Ser Arg Val
 260 265 270
 Thr Leu His Asn Glu Ser Tyr Ile Glu Glu Leu Asp Ile Arg Ile Gly
 275 280 285
 Asp Trp Val Leu Val His Lys Ala Gly Gly Val Ile Pro Glu Val Leu
 290 295 300
 Arg Val Leu Lys Glu Arg Arg Thr Gly Ala Glu Arg Pro Ile Val Trp
 305 310 315 320
 Pro Glu Asn Cys Pro Glu Cys Gly His His Leu Val Lys Glu Gly Lys
 325 330 335
 Val His Arg Cys Pro Asn Pro Leu Cys Pro Ala Lys Arg Phe Glu Ala
 340 345 350
 Ile Arg His Tyr Ala Ser Arg Lys Ala Met Asp Ile Gln Gly Leu Gly
 355 360 365
 Glu Lys Leu Ile Glu Lys Leu Leu Glu Asn Gly Leu Val Lys Asp Val
 370 375 380
 Ala Asp Leu Tyr Arg Leu Arg Lys Glu Asp Leu Val Gly Leu Glu Arg
 385 390 395 400
 Met Gly Glu Lys Ser Ala Glu Asn Leu Leu Arg Gln Ile Glu Glu Ser
 405 410 415
 Lys His Arg Gly Leu Glu Arg Leu Leu Tyr Ala Leu Gly Leu Pro Gly
 420 425 430
 Val Gly Glu Val Leu Ala Arg Asn Leu Ala Ala Arg Phe Gly Thr Met
 435 440 445
 Asp Arg Leu Leu Glu Ala Thr Leu Glu Glu Leu Leu Glu Val Glu Glu
 450 455 460
 Val Gly Glu Leu Thr Ala Arg Gly Ile Trp Glu Thr Leu Gln Asp Pro
 465 470 475 480
 Ala

<210> 31

<211> 674

<212> PRT

<213> *Thermus scotoductus*

<400> 31

Met Thr Leu Glu Glu Ala Arg Lys Arg Val Asn Glu Leu Arg Asp Leu
1 5 10 15

Ile Arg Tyr His Asn Tyr Arg Tyr Tyr Val Leu Ala Asp Pro Glu Ile
20 25 30

Ser Asp Ala Glu Tyr Asp Arg Leu Leu Arg Glu Leu Lys Glu Leu Glu
35 40 45

Glu Arg Phe Pro Glu Leu Lys Ser Pro Asp Ser Pro Thr Glu Gln Val
50 55 60

Gly Ala Lys Pro Leu Glu Ala Thr Phe Arg Pro Ile Arg His Pro Thr
65 70 75 80

Arg Met Tyr Ser Leu Asp Asn Ala Phe Asn Phe Asp Glu Leu Lys Ala
85 90 95

Phe Glu Glu Arg Ile Gly Arg Ala Leu Gly Arg Glu Gly Pro Phe Ala
100 105 110

Tyr Thr Val Glu His Lys Val Asp Gly Leu Ser Val Asn Leu Tyr Tyr
115 120 125

Glu Asp Gly Val Leu Val Trp Gly Ala Thr Arg Gly Asp Gly Glu Val
130 135 140

Gly Glu Glu Val Thr Gln Asn Leu Leu Thr Ile Pro Thr Ile Pro Arg
145 150 155 160

Arg Val Lys Gly Val Pro Glu Arg Leu Glu Val Arg Gly Glu Val Tyr
165 170 175

Met Pro Ile Glu Ala Phe Leu Arg Leu Asn Glu Glu Leu Glu Glu Lys
180 185 190

Gly Glu Lys Ile Phe Lys Asn Pro Arg Asn Ala Ala Ala Gly Ser Leu
195 200 205

Arg Gln Lys Asp Pro Arg Ile Thr Ala Arg Arg Gly Leu Arg Ala Thr

210	215	220
Phe Tyr Ala Leu Gly Leu Gly Leu Glu Glu Ser Gly Leu Lys Thr Gln		
225	230	235 240
Leu Asp Leu Leu His Trp Leu Arg Glu Lys Gly Phe Pro Val Glu His		
	245	250 255
Gly Phe Ala Arg Ala Glu Gly Ala Glu Gly Val Glu Arg Ile Tyr Gln		
	260	265 270
Gly Trp Leu Lys Glu Arg Arg Ser Leu Pro Phe Glu Ala Asp Gly Val		
	275	280 285
Val Val Lys Leu Asp Glu Leu Ser Leu Trp Arg Glu Leu Gly Tyr Thr		
	290	295 300
Ala Arg Ala Pro Arg Phe Ala Ile Ala Tyr Lys Phe Pro Ala Glu Glu		
305	310	315 320
Lys Glu Thr Arg Leu Leu Gln Val Val Phe Gln Val Gly Arg Thr Gly		
	325	330 335
Arg Val Thr Pro Val Gly Ile Leu Glu Pro Val Phe Ile Glu Gly Ser		
	340	345 350
Val Val Ser Arg Val Thr Leu His Asn Glu Ser Tyr Ile Glu Glu Leu		
	355	360 365
Asp Val Arg Ile Gly Asp Trp Val Leu Val His Lys Ala Gly Gly Val		
	370	375 380
Ile Pro Glu Val Leu Arg Val Leu Lys Glu Lys Arg Thr Gly Glu Glu		
385	390	395 400
Arg Pro Ile Arg Trp Pro Glu Thr Cys Pro Glu Cys Gly His Arg Leu		
	405	410 415
Val Lys Glu Gly Lys Val His Arg Cys Pro Asn Pro Leu Cys Pro Ala		
	420	425 430
Lys Arg Phe Glu Ala Ile Arg His Tyr Ala Ser Arg Lys Ala Met Asp		
	435	440 445
Ile Gly Gly Leu Gly Glu Lys Leu Ile Glu Lys Leu Leu Glu Lys Gly		
	450	455 460
Leu Val Lys Asp Val Ala Asp Leu Tyr Arg Leu Lys Lys Glu Asp Leu		

465		470		475		480
Leu Gly Leu Glu Arg Met Gly Glu Lys Ser Ala Gln Asn Leu Leu Arg						
	485		490		495	
Gln Ile Glu Glu Ser Lys Gly Arg Gly Leu Glu Arg Leu Leu Tyr Ala						
	500		505		510	
Leu Gly Leu Pro Gly Val Gly Glu Val Leu Ala Arg Asn Leu Ala Ala						
	515		520		525	
His Phe Gly Thr Met Asp Arg Leu Leu Glu Ala Ser Leu Glu Glu Leu						
	530		535		540	
Leu Gln Val Glu Glu Val Gly Glu Leu Thr Ala Arg Gly Ile Tyr Glu						
545		550		555		560
Thr Leu Gln Asp Pro Ala Phe Arg Asp Leu Val Arg Arg Leu Lys Glu						
	565		570		575	
Ala Gly Val Val Met Glu Ala Lys Glu Arg Gly Glu Glu Ala Leu Lys						
	580		585		590	
Gly Leu Thr Phe Val Ile Thr Gly Glu Leu Ser Arg Pro Arg Glu Glu						
	595		600		605	
Val Lys Ala Leu Leu Arg Arg Leu Gly Ala Lys Val Thr Asp Ser Val						
	610		615		620	
Ser Arg Lys Thr Ser Tyr Leu Val Val Gly Glu Asn Pro Gly Ser Lys						
625		630		635		640
Leu Glu Lys Ala Arg Ala Leu Gly Val Pro Thr Leu Thr Glu Glu Glu						
	645		650		655	
Leu Tyr Arg Leu Ile Glu Glu Arg Thr Gly Lys Pro Val Glu Thr Leu						
	660		665		670	
Ala Ser						